

IN THE CLAIMS:

1. (Currently Amended) A ~~process~~Process for producing CaCO₃, characterized in that it comprises the steps of:

- a) catalysing the hydration of CO₂ contained in a CO₂-containing gas by means of an enzyme capable of catalysing the hydration of dissolved CO₂ into hydrogen ions and bicarbonate ions, thereby producing a solution containing bicarbonate ions and hydrogen ions, said enzyme being carbonic anhydrase;
- b) reacting the bicarbonate ions contained in the solution obtained in step a) with calcium ions, thereby producing a solution containing CaCO₃;
- c) precipitating the CaCO₃ contained in the solution obtained in step b); and

wherein the step b) comprises the step of:

[[[-]]] mixing the solution obtained in step a) with Ca(OH)₂, thereby providing simultaneously said calcium ions, for CaCO₃ production and OH⁻ ions for H⁺ neutralisation.

2. (Currently Amended) A ~~process~~The process according to claim 1, characterized in that step a) of hydration of CO₂ is performed in a bioreactor comprising a reaction chamber filled with said enzyme and the step b) is performed in at least one separate reaction tank, the process further comprising a step of directing a flow of said solution from said bioreactor into said reaction tank.

3. (Currently Amended) A ~~process~~The process according to claim 2, characterized in that the reaction chamber is filled with packing on which the enzyme is immobilized.

4. (Currently Amended) ~~A process~~The process according to ~~any one of claims 1 to 3~~claim 1, characterized in that step b) is performed under stirring to prevent the calcium carbonate from settling.

5. (Currently Amended) ~~A process~~The process according to ~~any one of claims 1 to 4~~claim 1, characterized in that it comprises an additional step of:

d) separating the precipitate of CaCO₃ of step c) from the solution.

6. (Currently Amended) ~~A process~~The process according to claim 7, characterized in that step d) of separating consists of filtering.

7. (Currently Amended) ~~An apparatus~~Apparatus for producing CaCO₃ according to the process defined in claim 1, characterized in that it comprises:

[[[-]] catalyzing means for catalysing the hydration of the CO₂ into bicarbonate ions and hydrogen ions;

[[[-]] reacting means for reacting the bicarbonate ions and protons obtained in the catalyzing means with calcium ions and hydroxyl ions to produce CaCO₃; and

[[[-]] precipitating means for precipitating the CaCO₃ obtained in the reacting means; wherein

the means for catalyzing the hydration of the CO₂ comprises a bioreactor comprising:

[[[-]] a gas inlet for receiving gaseous CO₂;

[[[-]] a liquid inlet for receiving an aqueous liquid;

[[[-]] a reaction chamber in fluid communication with the gas inlet and the liquid inlet, the reaction chamber containing therein carbonic anhydrase for catalysing the hydration of dissolved CO₂ into bicarbonate ions and hydrogen ions; and

[[-]] a liquid outlet in fluid communication with the reaction chamber for discharging a solution of bicarbonate ions and hydrogen ions.

8. (Currently Amended) ~~An apparatus~~The apparatus as claimed in claim 7, characterized in that the means for reacting the bicarbonate ions with calcium ions and precipitating CaCO₃ is at least one reaction tank having an inlet in fluid communication with the liquid outlet of the bioreactor and an outlet to discharge a solution containing CaCO₃.

9. (Currently Amended) ~~An apparatus~~The apparatus as claimed in claim 11, characterized in that it comprises a buffer tank having an inlet in fluid communication with the outlet of the at least one reaction tank for receiving and reserving the solution obtained in said at least one reaction tank for a further treatment.

10. (Currently Amended) ~~An apparatus~~The apparatus according to claim 9, characterized in that it comprises a filter in fluid communication with said buffer tank to separate the CaCO₃ from the solution.

11. (Currently Amended) ~~An apparatus~~The apparatus according to claim 10, characterized in that the solution free of CaCO₃ is recycled and reused in the reaction tank.